

A CHECKLIST TO THE ENNOMINAE (GEOMETRIDAE) OF COSTA RICA: TAXONOMY FOR A NATIONAL BIODIVERSITY INVENTORY*

CATALOGO SISTEMATICO DE LOS ENNOMINAE (GEOMETRIDAE) DE COSTA RICA: TAXONOMIA PARA UN INVENTARIO NACIONAL DE BIODIVERSIDAD

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ABSTRACT

A checklist to the Ennominae of Costa Rica is presented. The names of 597 species are included. Taxonomic context has been given to the work by examining type species and other representatives of the relevant genera across the whole geographic range of the neotropical region. Many of the genera to which the species have been assigned have been critically reviewed during the course of this study. Twenty two species names are recombined, and the names of seven species and one genus are synonymized. The work was based on specimens collected over two decades in Costa Rica, which are housed in the Instituto Nacional de Biodiversidad, and also on material in The Natural History Museum, London and the National Museum of Natural History, Washington, D.C. Wherever possible, identifications have been checked against type specimens.

KEYWORDS: Lepidoptera, Geometridae, Ennominae, Costa Rica, checklist, biodiversity inventory, Darwin Initiative.

INTRODUCTION

Arguments for the relevance and value of systematics in coping with the biodiversity crisis have been well rehearsed in the literature (e.g., Soulé, 1990; Wilson, 1992; Janzen, 1993; Vane-Wright, 1993). While systematists make a variety

RESUMEN

Se presenta un catálogo sistemático de los Ennominae de Costa Rica. Se incluyen los nombres de 597 especies. Se ha dado contexto taxonómico al trabajo mediante el examen de especies tipo y otros géneros relevantes a lo largo de todo el rango geográfico de la región neotropical. Muchos de los géneros a los que las especies han sido asignadas han sido revisados de forma crítica durante el transcurso de este estudio. Veintidós nombres de especies han sido recombinados, y los nombres de siete especies y de un género han sido sinonimizados. El trabajo se ha basado en especímenes recolectados durante dos décadas en Costa Rica, almacenados en el Instituto Nacional de Biodiversidad, y también en material del Natural History Museum de Londres y del National Museum of Natural History de Washington D.C. Cuando ha sido posible, las identificaciones se han contrastado con los especímenes tipo.

PALABRAS CLAVES: Lepidoptera, Geometridae, Ennominae, Costa Rica, catálogo taxonómico, inventario de biodiversidad, Darwin Initiative.

of contributions to biodiversity studies, the most fundamental of these is to provide a system of classification that enables biological information to be correctly linked to a given taxon usually at the category of species.

In this paper, we provide a checklist to the Costa Rican species of a subfamily of moths belonging to the family Geometridae, the moths with looper caterpillars. This checklist is a contribution to Costa Rica's National Biodiversity Inventory. Although an inventory is typically perceived to be a list, we prefer to think of it in more dynamic terms as a growing knowledge and reference system, of which a checklist appears as a by product and index (Janzen, 1993)

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frozen into print at a particular time. The objectives of the Costa Rican National Biodiversity Inventory are intended to facilitate: determination and identification of the species and other levels of biodiversity present; access to knowledge about the distribution of any given taxon; reliable access by the user community to specimens, images or other data; and, in the long term, an understanding of the natural history of a given species.

THE TARGET TAXON. The focus of this work is the Ennominae, a subfamily that includes about half the known species of the family Geometridae. The Geometridae are an appropriate target taxon for biodiversity inventory studies for several reasons. First, this group of moths is among the most species rich families of Lepidoptera, with c. 21,000 species globally (Scoble, Gaston & Crook, 1995). It is exceeded in number of species only by Pyralidae (i.e., Pyraliformes plus Crambiformes) and Noctuidae. The ecological impact of Geometridae, particularly in the tropics, is unmeasured, but Lepidoptera caterpillars are major consumers of green plants, eating more leaves than all other herbivores combined (Stamp & Casey, 1993), and it can be assumed that geometers have a highly significant effect as primary consumers.

Second, the family is well sampled, particularly in Costa Rica. Numerous specimens were collected during the late 19th century and throughout the current century. Moreover, sampling at light has been extensive and intensive over the last decade and a half by parataxonomists based at the Instituto Nacional de Biodiversidad (INBio), and by others. Material collected recently is housed in INBio and has provided a major source of information for the work reported in the present paper.

Third, there exists a well curated collection of Geometridae representing perhaps 60-70 percent of the world's species housed in The Natural History Museum, London (BMNH), and having an associated taxonomic card index. This index, has provided the foundation of a global taxonomic facility (GTF) to geometer moths. The facility takes the form of a computerized database of fundamental taxonomic information to every available species and subspecies name (valid or synonymous) in the family. Furthermore, the co-

llection and card index, which can be viewed as a physical database (West and Nielsen, 1992), includes many unpublished generic combinations. This information has been useful in refining generic concepts adopted in the Costa Rican checklist. In addition, we have benefited from access to other collections with large holdings of neotropical geometers, including type specimens, notably in the National Museum of Natural History, Washington (USMN).

Fourth, the Geometridae have been the subject of a biodiversity study in patterns of species description, based specifically on taxonomic data (Gaston, Scoble & Crook, 1995).

PERSPECTIVES. This study should be viewed against the background of revisionary work on Geometridae across the neotropics in particular and the globe in general. Recent revisions pertinent to the taxonomy of Costa Rican ennomine geometers are listed below. The results of work on geometer moths by the geometrid research group at the BMNH and by our colleagues elsewhere have enabled us continually to modify the database constructed for the Costa Rican study. Additionally, there has been a reciprocal relationship between the Costa Rican project and the GTF. Information in each database has been used to make improvements to the other: the Costa Rican work has enabled us to refine the global database, and the GTF has helped us to give the regional study taxonomic perspective, most notably at the generic level.

A further benefit gained from the Costa Rican study has been the picture that has emerged from our assessment of species richness in Geometridae across the neotropics with access to a large recent collection. For Geometridae at least, it appears unlikely that the total number of neotropical species is likely to rise to any great extent (see Scoble, Gaston & Crook, 1995). Our colleagues have emphasized, not unreasonably, that Costa Rica is exceptional in benefiting from a history of taxonomic work prior to the INBio initiative of the last fifteen years. Nevertheless, the intensity of collecting by INBio staff is unlikely to have been matched in the earlier work. Although pockets of unstudied endemism within the neotropics unquestionably exist, our taxonomic work across the region suggests that revision reveals many synonyms as well as new species.

Furthermore, it is clear that many species are distributed widely. But while our understanding of species numbers may be reasonably accurate, certainly to within an order of magnitude, we remain a long way from the taxonomically 'clean' system appealed for by Janzen (1993), particularly at the generic level.

COLLABORATION. The work published here is the result of collaboration between two institutes having different histories (INBio and the BMNH). INBio's mission is to understand Costa Rican wildland biodiversity in order to promote its sustainable and non destructive use for national socioeconomic development. INBio, which has been recently established, has provided, in particular, the vital sampling and sorting preparatory to specimen databasing of large numbers of geometer moths. The internationally recognized facilities and skills at the long established BMNH have played a major role in building and refining the species list and providing taxonomic perspective, notably in critical assessment of the genera to which the species are assigned. In addition, BMNH staff provided specialized taxonomic training. We have found the qualities of INBio and the BMNH to be highly complementary and believe that significant benefits have accrued to both institutes and to the wider community concerned with Costa Rican biodiversity.

THE DARWIN INITIATIVE FOR THE SURVIVAL OF SPECIES. The project was supported by the Darwin Initiative for the Survival of Species, a UK venture for funding international collaborative projects related to conserving biodiversity. The initiative was announced by the Prime Minister at the UNCED 'Earth Summit' in Rio de Janeiro and is administered by the UK Department of the Environment. It is intended to support projects that strengthened links between Britain and those countries rich in biodiversity but with limited resources for its conservation.

The project on Costa Rican moths included several features fundamental to in the purpose of the Darwin Initiative. Particularly important was the strong element of training and the input to the Costa Rican National Biological Inventory.

METHODS. The checklist is the end product of a study that involved the collection and preparation

of numerous specimens from Costa Rica, sorting, taxonomic study, the construction of a computerized database, and the development of a research and reference collection of approximately 9,500 named ennomine moths in INBio. After specimens had been sorted into species, provisional identifications were made using both material already identified in INBio and the BMNH and taxonomic publications. Identifications were confirmed, as far as possible, by comparing exemplars with type specimens housed in various museums, particularly at the BMNH and the USNM. Identification in many cases required dissection of the genitalia for access to taxonomically more reliable characters. The terminology of genitalic structures largely follows that of Klotz (1956).

Details were entered in the relational database PARADOX, and the research and reference collection of Costa Rican Ennominae was arranged and continually refined as the study progressed.

The checklist presented below belies the extensive effort that went into its construction. Specimens were collected over many years. Lengthy curatorial work was required in the preparation of specimens and arrangement of the reference collection. Identification involved making c. 530 genitalic preparations on microscope slides, extensive comparisons with existing publications, and the study of various collections. In addition, much effort went into assessing the generic assignment of the species and examining critically the taxonomic validity of the genera. Results of the generic study are being used in a wider review of ennomine genera across the neotropics. Considerable progress in producing an improved generic framework was made during the course of this work.

The computerized species inventory was contributed to the National Biological Inventory of Costa Rica. This information has also been incorporated in the GTF for a project leading to a catalogue of species and subspecies Geometridae of the world.

ENNOMINE GEOMETER MOTHS: SOME GENERAL COMMENTS. While the family Geometridae is well defined on the basis of morphological details of the tympanal organs, delimitation of subfamilies and tribes is less certain. The Ennominae are defined on the basis of the absence, or weak (non tubu-

lar) condition, of vein M^2 in the hindwing. Although no apomorphic character presence has been identified for this subfamily, the Ennominae may well be monophyletic.

On a global basis the subfamily includes almost 10,000 described and putatively valid species, a figure representing almost half the number of geometer species (Scoble, Gaston & Crook, 1995). Of these, approximately 3300 species are recorded in the neotropics with 600 from Costa Rica.

Ennominae are predominantly tropical and subtropical, although the group is well represented elsewhere. The global distribution and high species richness of the group possibly explains the difficulties experienced in attempts to divide the subfamily into infrasubfamilial taxa. The most recent review of ennomine classification at the tribal level was undertaken by Holloway [1994], who listed the tribal names and commented on their taxonomic veracity. Although Holloway's study was based primarily on groups from S.E. Asia, the work was undertaken in a global context and is of wide relevance.

Since much resolution is still required at the tribal level, the approach taken in the present work was essentially pragmatic and has gone no further up the taxonomic hierarchy than assigning species to genera. We believe, however, that by critically examining ennomine classification at the generic level, refining the tribal classification will be eased.

SOURCES OF TAXONOMIC CHARACTERS. Taxonomic characters used in assigning species to genera are reviewed briefly immediately below. Comments are also made on features relating to supraspecific taxa. Characters used in the present study have been derived entirely from structures of the adult: immature stages of very few neotropical species of Ennominae are available for study.

HEAD. The antennae of most male Ennominae are bipectinate, but in several genera they are simple in both sexes, including *Pyrinia*, *Euclisia* and some Ourapterygini e.g., *Oxydia*, *Sabulodes* and *Nematomampa* (simple to very weakly pectinate). Although the presence of bipectinate or simple antennae are sometimes of value in generic diagnosis, the condition often varies between species belonging to the same genus, as in *Patalene* and *Pero*.

Compound eyes have not provided many characters, but the very large size of these structures in Sphaecelodini (represented by *Sphaecelodes* in the checklist) were noted by Forbes (1948: 87).

Chaetosemata typically are present in Geometridae. In Macariini these structures are usually extended across the head instead of being discrete and well separated. The extended condition is found in most Costa Rican macarine species.

A reduced proboscis occurs in most Bistonini (Rindge, 1985: 21). This condition occurs in some species of *Acronyctodes* (the only genus of this tribe represented in Costa Rican), but in other species of *Acronyctodes* the proboscis is not reduced (Rindge, 1985: 7).

THORAX. A hair pencil located in a groove on the hind tibia occurs in males of many species of Ennominae. The structure may be present or absent within genera.

Wing pattern and colour provide an invaluable source of characters both for identification and classification at the generic level as well as for distinguishing species. Although similar patterns commonly occur in different genera, close examination of pattern often reveals consistent differences. For example, in Palyadini the positions of eyespots differ consistently between genera. Another notable example is the green wing colour in the genus *Phyle*. Green is rare in Ennominae; brown, yellow and white are the colours that predominate in the subfamily.

Several genera can be recognized by distinctive wing shape. The outer margin of the fore wing is irregularly scalloped in *Nepitia* and in many species of *Pero*, and this feature is typical of the tribe Azelinini to which they belong (Forbes, 1948: 22). In various genera (e.g., *Euclisia* and *Urepione*), the outer margins of the fore and hind wings are extended and angled at vein M_3 , sometimes forming a slight tail on the hind wing. Strong irregularity of the outer margins of both fore and hind wings is characteristic of *Phyllostonta* (Ourapterygini), *Eutomopepla* and *Tmetomorpha* (currently unplaced), among others. The apex of the fore wing is sometimes falcate, a feature often pronounced in *Patalene* and variable in *Oxydia*.

The absence of a frenulum retinaculum wing coupling system and its replacement with an expanded humeral lobe is apomorphic of the Paly-

dini (represented in Costa Rica by genera including *Phrygionis* and *Opisthoxia*) (Scoble, 1995).

A blister like fovea of variable structure occurs near the base of the fore wing of the male, and sometimes also the female, in some genera of certain tribes (see Forbes, 1948: 16-21, and Holloway, 1993 [1994]: 10, who noted a possible correlation between the presence of a fovea and a bifid cremaster in the pupa). In the neotropics, a fovea occurs frequently in Macariini and Boarmiini (e.g., *Glena*). Caberini (represented in Costa Rica by *Erastria* and *Numia*) do not have a fovea, but the base of vein Sc in the male hind wing is swollen (Forbes, 1948: 19, 22, 69).

ABDOMEN. A minute pouch or sac extends from the wall of the tympanal organ in several genera, including *Sabulodes*, *Isochromodes*, *Nemato-campa* and *Pyrinia*.

Sternum A3 of the male often bears a transverse comb or patch of setae, the presence of which character is correlated with the occurrence of a tibial hair pencil (Rindge, 1990b: 7-8). The presence or absence of a comb of setae is often consistent throughout a genus, but both states occur in certain genera, e.g. *Epimecis* and *Sabulodes*.

The intersegmental membrane of segments A3 and A4 of the male is invaginated, sometimes with a single or double setal tuft, as in most Melanolophini (Rindge, 1990b).

Also in most Melanolophini, the intersegmental membrane of sterna A7 and A8 of the male bears paired comb-like structures of elongated scales.

Abdominal sternum A8 is usually simple, but its posterior margin is extended as a pair of processes in most Costa Rican Macariini.

MALE GENITALIA. The male genitalia are structures of particular importance in the definition and diagnosis of ennomine genera.

The uncus is commonly tapered or takes the form of a short rod, but various other shapes exist. The uncus is prominent and rounded in many *Sabulodes* species; bifurcate in *Phyllodonta* and *Epimecis*; typically lacks an extended process in *Cirsodes*; and is tipped with a pair of spine-like horns in many Macariini (but not *Se-miothisa*). Complex modifications occur in some Nacophorini: in *Cidariophanes* a dorsal process,

the pseudouncus (Rindge, 1983: 154), is present, and in *Ischnopteris* the uncus is large and hood-like with small apical projections.

Socii vary, when present, in shape and degree of development. Usually weakly developed, they are long and slender in a few genera (e.g., *Cirsodes*).

The gnathos commonly is a slender loop, but modifications often exist at the point of fusion of the two arms. In many genera, including *Epimecis*, *Eusarca*, *Metanema* and *Oxydia*, a spinose plate, with numerous small spines or a few large spines sometimes in a rake-like row, is formed in this area. Less commonly the gnathos is only weakly developed or is absent, as, for example, in the Baptini (represented in Costa Rica by *Lomographa*), and the genera *Anacamptodes* (Boarmiini), *Erastria* (Caberini) and *Thyrinteina* (Nacophorini).

Various complex sclerotized structures occur in the anellar region. In Nacophorini, notably *Betulodes* and *Holochroa*, the transtilla is highly modified with a pair of large pointed heavily sclerotized processes.

The furca is a sclerotized process apparently derived from the juxta and other anellar structure. A strongly asymmetrical and spinose furca is often present in the Ourapterygini; it is characteristic of *Oxydia*, *Eusarca* and *Besma*, for example, but absent from certain other genera currently placed in that tribe, including *Nemato-campa*, *Nepheloleuca*, *Phyllodonta* and *Sabulodes*. Both states occur within *Sicya* and *Patalene*. A furca is characteristic also of many genera not yet assigned to a tribe, including *Bassania*, *Can-nagara*, *Hygrochroma*, *Leucula*, and *Nephodia*. At least some of these genera are likely to be referable to the Ourapterygini. Furca-like structures, possibly homologous, occur in other genera, e.g. *Apicioipsis*. Certain Old World Boarmiini also have a furca-like structure according to Holloway (1993 [1994]: 11), and further investigation of the structures and reappraisal of tribes and genera is required. A double furca, though lost in some species, defines the Hypochrosini (including Anagogini) (Holloway (1993 [1994]: 17). It is present in the type species (not Neotropical) of *Cephis* and *Metanema* but their Costa Rican representatives, have the ourapterygine type of furca and are here excluded from those genera. The Costa Rican species and a range of other Neotro-

pical Hypochrosini examined are excluded from that tribe as defined currently.

A pair of finely setose patches (cristae), strongly or weakly developed, occur between the base of the valva and the anellus of many Boarmiini (including in *Iridopsis*, *Hypomesis*, *Melanchoria*, *Physocleora*, *Stenalcidia*, *Tornos* and most species of *Glena*). Cristae are also present in *Phyle*.

The shape of the valva and the form and position of various processes that may be present are of taxonomic value. For example, a spine-like costal process is present in *Sabulodes*. The valva is divided into costal and saccular components in the Macariini (represented in Costa Rica by *Macaria*, *Digrammia* and *Semiothisa*), and also in Cassymini (represented in Costa Rica by a species excluded from *Itame* but of unknown generic affinity: *odrussa* Druce) where the dorsal arm is slender and curved or angled. Certain genera outside these tribes, including *Iridopsis*, also have a divided valva. A finely setose condition of the ventral surface of the valva is fairly widespread among the Ennominae.

Coremata are present at the base of the valva in various genera and are well developed in *Nematocampa* and *Phyle* among others.

The aedeagus is sometimes modified by the presence of processes. A tongue-like or pointed posterior extension occurs in many genera, including *Acronyctodes*, *Besma*, *Bassania*, *Hygrochroma*, *Lambdina*, *Leucula*, *Leuculopsis* and *Phyle*. Others, for example *Stibaractis* and *Bonatea* have more bizarre structures.

Cornuti may be multiple, single or absent. Their size, shape and arrangement are subject to considerable variation, but characters are more consistent in some genera: *Oenoptila*, for example, usually has a single multi-tipped cornutus.

FEMALE GENITALIA. Characters of the ostial region are often of great taxonomic value, but more so in defining species than genera. The sterigma may be more-or-less membranous, as in *Phyle*,

but more usually it is sclerotized, with varying structure.

The ductus bursae or the posterior part of the corpus bursae has numerous longitudinal striations in a wide range of ennomine genera.

A disc-like signum with radiating spines, and variations on that structure, occur widely in the Ennominae. Strongly different structures are less common but a signum with two large processes that are tapered or finger-like occurs in several genera including *Bryoptera*, *Prochoerodes* and *Polla*. Most species of *Thysanopyga* have a spinulose patch in place of a discrete signum (Krüger & Scoble, 1992: 83); a feature rarely seen in other genera. In some Ennominae the signum is absent, consistently so in *Sabulodes*.

RECENT (POST 1960) STUDIES RELEVANT TO THE PRESENT WORKS

Unsurprisingly, most publications listed are on neotropical Ennominae. However, some extra-limital works are included because of their relevance to neotropical tribal or generic classification.

- Macariini (Scoble & Krüger; Hua & Scoble; Ferguson; in prep.)
- Melanolophiini (Rindge, 1964, 1990b)
- Nacophorini (Rindge 1961, 1983)
- Palyadini (Scoble, 1994, 1995)
- Ennominae of Borneo (Holloway, 1993 [1994])
- Ennominae of Canada (McGuffin, 1972)
- Acronyctodes* (Rindge, 1985)
- Anacamptodes* (Rindge, 1966)
- Glena* (Rindge, 1965, 1967)
- Lomographa* (Rindge, 1979; N. America)
- Pero* (Poole, 1987)
- Perissopteryx* (Krüger & Scoble, 1992)
- Phyle* (Rindge, 1990a)
- Sabulodes* (Rindge, 1978)
- Thysanopyga* (Krüger & Scoble, 1992)
- Current studies by Ferguson (in prep.) involve various other genera.

CHECKLIST OF THE SPECIES

The Costa Rican records of species marked "[CR?]" require confirmation.

ACRONYCTODES Edwards, 1884

cautama (Schaus, 1901)

ACROSEMIA Herrich-Schäffer, [1855] 1850-1858

molpina Schaus, 1901 [CR?] [probably a junior synonym of *undilinea* Warren]

undilinea Warren, 1897

ochrolaria Schaus, 1897

vulpecularia Herrich-Schäffer, 1858

vulpina (Thierry-Mieg, 1915)

ACROTOMIA Herrich-Schäffer, [1855] 1850-1858

trilva Schaus, 1901

viminaria Herrich-Schäffer, 1856

marcida (Warren, 1907)

subfasciata (Warren, 1897)

sctaria Druce, 1892

"**ACROTOMIA**" [species probably misplaced]

mucia Druce, 1892

ACROTOMODES Warren, 1895

chiriquensis Schaus, 1908

hemixantha Prout, 1910

hielaria Schaus, 1901 [CR?]

polla Druce, 1892

4 further species unidentified and possibly undescribed

AENICTES Warren, 1895

polygrapharia (Herrich-Schäffer, 1856)

nyparia (Walker, 1860)

ANACAMPTODES McDunnough, 1920 [near or synonym of *Iridopsis* Warren]

herse (Schaus, 1912)

lurida (Schaus, 1918)

ANISCHNOPTERIS Rindge, 1983

chryses Godman & Salvin [date untraced]

ANISOPERAS Warren, 1895

atropunctaria (Walker, [1863] 1862)

dolens Druce, 1898

subfulvata Warren, 1897

tessellata (Walker, [1863])

albinorsa Warren, 1905

1 further species (near *dolens*) unidentified and possibly undescribed

ANTEPIONE Packard, 1876

- thisoaria* (Guenée, [1858])
arcasaria (Walker, 1860)
azonax (Druce, 1892)
constricta (Warren, 1895)
depontanata (Grote, 1864)
furciferata (Packard, 1876)
rhomboidaria (Oberthür, 1912)
rivilata (Warren, 1897)
tiselaaria (Dyar, 1912)

APICIOPSIS Warren, 1904

1 species unidentified and possibly undescribed

APLOGOMPHA Warren, 1897

- argentilinea* Schaus, 1911
chotaria Schaus, 1895
costimaculata (Warren, 1900)
frena Dognin, 1899

ARGYROTOME Warren, 1894

- PARARGYROTOME* Debauche, 1937
alba (Druce, 1892)
melae (Druce, 1892)
mira Oberthür, 1883
prospectata (Snellen, 1874)

AESTRA Warren, 1895

- cabiria* (Druce, 1892)

ASTYOCHELIA Druce, 1885

- cetaria* (Druce, 1893)
crane Druce, 1885
faula Druce, 1855
fessonnia Druce, 1885
illineata Warren, 1897
lachesis Schaus, 1912
vaporaria (Hübner, [1831])
nigrivena (Warren, 1897)

ATERPNODES Warren, 1900

- geminipuncta* Warren, 1900

BAGODARES Druce, 1893

- prosa* Druce, 1893

BALLANTIOPHORA Butler, 1881

- gibbiferata* (Guenée, [1858])
bisignata (Walker, 1861)
innotata Warren, 1894

BASSANIA Walker, 1860

amethystata Walker, 1860

meropia (Druce, 1892)

crocallinaria (Oberthür, 1883)

schematica (Dyar, 1910)

olivacea Warren, 1907

1 further species unidentified and possibly undescribed

BERBERODES Guenée, [1858]

trilinea Schaus, 1911

BESMA Capps, 1943

brea (Druce, 1892)

BETULODES Thierry-Mieg, 1904

matharma (Druce, 1892)

1 further species unidentified and possibly undescribed

BONATEA Druce, 1892

duciata (Maassen, 1890)

praeclarus Schaus, 1911

1 further species unidentified and possibly undescribed

BRACHURAPTERYX Warren, 1894

tesserata (Guenée, [1858])

BRYOPTERA Guenée, [1858]

canitiata Guenée, [1858]

friaria (Schaus, 1913)

hypomelas (Kaye, 1901)

infuscaria Guenée, [1858]

larentiata (Walker, 1860)

subbrunnea Warren, 1900

CALLIPSEUSTES Warren, 1900

variegata Bastelberger, 1908 [CR?]

CANNAGARA Walker, 1860

bubona (Druce, 1892)

4 further species unidentified and possibly undescribed

CARGOLIA Schaus, 1901

albipuncta Schaus, 1901

CARPELLA Walker, [1865] 1864

CAPELLA Walker, [1865] 1864 [misspelling]

sublineata Dognin, 1902

? **CARPELLA**

1 species unidentified and possibly undescribed

CARTELLODES Warren, 1895

levis (Thierry-Mieg, 1893)

incartaria (Oberthür, 1912)

CATACRISMIA Schaus, 1913

hirsutaria Schaus, 1913

"**CEPPHIS**" Hübner, [1823] 1816 [excluded species]

megamede (Druce, 1892)

CERTIMA Walker, 1860

annaria Schaus, 1912

dositheata (Guenée, [1858])

combustaria (Maassen, 1890)

permotans Walker, 1860

turmalis (Schaus, 1911)

1 further unidentified and possibly undescribed species, placed provisionally in this genus.

CHRYSOMIMA Warren, 1894

semilutearia (Felder & Rogenhofer, 1875)

CIDARIOPHANES Warren, 1895

canopus (Druce, 1893)

luculenta Schaus, 1911

CIMICODES Guenée, [1858]

albicosta Dognin, 1914

clisthena (Stoll, [1782])

purpurea Schaus, 1911

1 further species unidentified and possibly undescribed

CIRSOODES Guenée, [1858]

acuminata Guenée, [1858]

buddhicaria Walker, 1863

budlloraria (Walker, 1860)

aggerata Schaus, 1911

macilentata Guenée, [1858]

planaria (Schaus, 1911) **comb. n.**

unicolor (Dognin, 1900) **comb. n.**

1 further species unidentified and possibly undescribed

CRATOPTERA Herrich-Schäffer, [1855] 1850-1858

atina Druce, 1892

viridirufa (Warren, 1901)

primularia (Druce, 1891)

zarunata (Thierry-Mieg, 1912)

CYCLOMIA Guenée, [1858]

disparilis Schaus, 1911

minuta (Druce, 1892)

ocana Schaus, 1901 [near or synonym of *vinosa* (Dognin)]

CYPHOEDMA Warren, no published reference found
transvolatata (Walker, 1860)

DASCIOPTERYX Warren, 1901
aristophilides (Druce, 1893)
polymenes (Druce, 1893)
1 further species unidentified and possibly undescribed

DESTUTIA Grossbeck, 1908
modica (Schaus, 1911)

DIGONODES Warren, 1895
ovaria (Guenée, [1858])
gemela (Dognin, 1894)

DIGRAMMIA Gumpenberg, 1887
nigricomma Warren, 1904 [CR?] comb. n. [see Hua & Scoble, in prep.]
nigrocomina Barnes & McDonough, 1914

EPIMECIS Hübner, [1825] 1816
 BRONCHELIA Guenée, [1858]
anonaria (Felder & Rogenhofer, 1875)
conjugaria (Guenée, [1858])
diffundaria (Walker, 1860)
fraternaria (Guenée, [1858]) [CR?]
marcida (Warren, 1906)
 repressa (Prout, 1922)
matronaria (Guenée, [1858])
nasica (Druce, 1892)
patronaria (Walker, 1860)
plumbilinea (Warren, 1905)
puellaria (Guenée, [1858])
 nigriplena (Warren, 1907)
semicompleta (Warren, 1905)
vexillata (Felder & Rogenhofer, 1875)

ERASTRIA Hübner, [1813] 1806
 TROTHIS Hübner, 1821
 SYRRHODIA Hübner, 1823
 CATOPYRRHA Hübner, 1823
 EUCHLIDON Hübner, 1823
 ACROLEUCA Herrich-Schäffer, 1855
decrepitaria (Hübner, 1823)
 aesymnusaria (Walker, 1860)
 combinataria (Walker, [1863])
 mascularia (Guenée, [1858])
 mimasaria (Walker, 1860)
 versatiliaria (Guenée, 1854)

EROSINA Guenée, [1858]

hyberniata fulvescens Prout, 1931

hyberniata hyberniata Guenée, [1858]

ERYCINOPSIS Felder, 1874

diaphana Felder, 1874

perspicua (Butler, 1876)

specularis (Warren, 1900)

EUCLYSIA Warren, 1894

angustitincta Schaus, 1923

columbipennis (Walker, 1860) [CR?]

intermedia Warren, 1907

dentifasciata Dognin, 1910

maculata (Warren, 1897)

EUSARCA Hübner, [1813] 1806

APICIA Guenée, [1858]

CABERODES Guenée, [1858]

EUDALIMIA Hübner, 1821

EUSAREA Hübner, [1825] [misspelling]

asanderaria (Walker, 1860)

asteria Druce, 1892

cayennaria (Guenée, 1860) [CR?]

alteraria (Guenée, [1858])

crameraria (Guenée, [1858])

demoleon (Schaus, 1913)

deoia (Schaus, 1913)

distycharia (Guenée, [1858])

fasciata Warren, 1895 [CR?]

flexilis (Schaus, 1912)

fractilineata Warren, 1895 [CR?]

fundaria (Guenée, [1858])

arbuaria (Walker, 1860)

basifusata (Walker, [1863])

carcearia (Walker, 1860)

effascinaria (Hulst, 1886)

eldanaria (Walker, 1860)

impexaria (Guenée, [1858])

incopularia (Guenée, 1860)

juncturaria (Guenée, [1858])

thasusaria (Walker, 1860)

lepidia (Dognin, 1903) [CR?]

melenda (Druce, 1892)

mera (Druce, 1892)

minoia (Druce, 1892) [possibly a junior synonym of *distycharia* Guenée]

minucia (Druce, 1892)

nemora (Druce, 1892)

oberthuri (Dognin, 1813)

quartaria (Oberthür, 1912)

trifilaria (Herrich-Schäffer, 1855)

8 further species unidentified and possibly undescribed

EUSTENOPHASMA Warren, 1897

constricta Warren, 1907

EUTOMOPEPLA Warren, 1894

ENTOMOPEPLA Warren, 1906 [misspelling]

artena (Druce, 1891)

peribleptaria (Dyar, 1912)

discuneata (Möschler, 1881)

grisea Schaus, 1901

fulgorifera Warren, 1904

vorda Schaus, 1901

EVITA Capps, 1943 [probably a junior synonym of *Neotherina*]

perfectinata (Schaus, 1912)

GENUSSA Walker, [1865] 1864

vicina Schaus, 1911

GLENA Hulst, 1896

MONROA Warren, 1904

HETERERANNIS Warren, 1904

basalis Rindge, 1967

gemina Rindge, 1967

hima Rindge, 1967

mopsaria (Schaus, 1913)

uncata Rindge, 1967

unipennaria cosmeta Rindge, 1967

2 further species unidentified and possibly undescribed

GYOSTEGA Warren, 1904

indentata Warren, 1909

simplex (Warren, 1906) [CR?]

1 further species unidentified and possibly undescribed

HERBITA Walker, 1860

IRA Walker, 1866

aglausaria flavidiscata Warren, 1900

amicaria (Schaus, 1912)

artayctes Druce, 1891

castanea Warren, 1905

cervina Warren, 1904

capnodiata (Guenée, [1858])

pacondiaria Jones, E.D., 1912

cyclopeata (Möschler, 1881)

sixola (Schaus, 1911)

declinata (Guenée, [1858])

extranea (Schaus, 1911) comb. n.

lilacina (Warren, 1897)

medama Druce, 1891

divisa Schaus, 1911
medona Druce, 1892
 aemula Warren, 1904
 transversata Warren, 1897
nedusia Druce, 1892
praeditaria (Herrich-Schäffer, 1856)
 saturniata (Guenée, [1858])
 transcendens (Walker, 1860)
 somnolenta (Warren, 1904)
tenebrica Dognin, 1892
 harmonidaria (Oberthür, 1911)
 singularis (Schaus, 1911)
ulpianaria (Schaus, 1923)
valtrudaria (Schaus, 1923)
4 further species unidentified and possibly undescribed

"**HERBITA**" [species probably misplaced]
subcostata (Warren, 1900)
 oswaldaria (Oberthür, 1911)

HIMEROMIMA Warren, 1904
aulis (Druce, 1892)

HOLOCHROA Hulst, 1896
 GLODURIA Dyar, 1924
2 species unidentified and possibly undescribed

HYALOSTENELE Warren, 1894
lutescens *lutescens* (Butler, 1872)

HYDATOSCIA Warren, 1904
ategua *ategua* (Druce, 1892)

HYGROCHROMA Herrich-Schäffer, [1855] 1850-1858
nondina Druce, 1892
 sceva Schaus, 1912 syn. n.
olivinaria Herrich-Schäffer, [1855]
1 further species unidentified and possibly undescribed

HYLAEA Hübner, 1822
 ELLOPIA Stephens, 1829 [junior homonym of Ellozia Treitschke, 1825]
 ELLOPIA Treitschke, 1825
 TERINA Hübner, [1823] 1816 [an incorrect (of a multiple) original spelling]
 THERINA Hübner, [1823] 1816
pardiria (Schaus, 1901)
silanaria (Schaus, 1912)
templadaria (Schaus, 1901)

HYMENOMIMA Warren, 1895
camerata Warren, 1900
 schisticolor Warren, 1904

conia Prout, 1931 [CR?]

memor (Warren, 1906)

infoveata Dognin, 1916

umbelularia (Hübner, [1825])

inceptaria (Walker, 1860)

2 further species unidentified and possibly undescribed

HYPOMECIS, Hübner, 1821

PSEUDOCBOARMIA McDunnough, 1920

laeca (Schaus, 1912)

HYPOMETALLA Warren, 1904

mimetata (Felder & Rogenhofer, 1875)

IRIDOPSIS Warren, 1894

aglauros (Schaus, 1912)

anaisaria (Oberthür, 1883)

tristaria (Maassen?, 1890)

aviceps Prout, 1932

chalcea (Oberthür, 1883)

divisata (Warren, 1905)

eutiches Prout, 1932 [CR?]

oberthuri Prout, 1932

syrniaria (Oberthür, 1993)

orizabaria (Schaus, 1897) comb. n. [CR?] [near or synonym of *chalcea* (Oberthür)]

pandrosos (Schaus, 1912)

2 further species unidentified and possibly undescribed

"**IRIDOPSIS**" [species probably misplaced]

validaria (Guenée, [1858])

reissi (Maassen?, 1890)

vidriadaria (Oberthür, 1883)

ISCHNOPTERIS Hübner, [1823] 1806

ISCHNOPTERIX Hübner, [1825] 1816

ISCHNOPTERYX Agassiz, 1847 [unjustified emendation]

AMBLURODES Warren, 1900

bryifera Felder & Rogenhofer, 1875

velledata Möschler, 1881

commixta (Warren, 1900) [CR?]

costiplaga Dognin, 1911

fabiana (Stoll, [1782]) [CR?]

chlorosata Hübner, [1825]

parvula Schaus, 1912

rostellaria Felder & Rogenhofer, 1875

1 further unidentified and possibly undescribed species, placed provisionally in this genus.

"**ISCHNOPTERIS**" [excluded species]

subalbata Dognin, 1910 [revision by M.M. Dias, in prep.]

ISOCHROMODES Warren, 1894

astrictica Warren, 1904

auxilians Warren, 1904 [CR?]

bellona Schaus, 1912

brunosa (Dognin, 1896)

beon (Druce, 1899)

canisquama (Warren, 1897)

terminata Warren, 1904

chiron Schaus, 1911 [near or synonym of *nebulosa* (Warren)]

epioneata (Walker, 1860) [CR?; Costa Rican males examined are not conspecific with the male type of
 submarginata (Warren)]

flavopuncta (Dognin, 1896)

submarginata (Warren, 1895)

extimaria (Walker, 1860)

grisea Warren, 1904

granula (Dognin, 1896)

bermeja (Dognin, 1896)

infida (Schaus, 1911)

jodea (Druce, 1898) [CR?]

nebulosa (Warren, 1901)

phyllira Schaus, 1911

sabularia (Dognin, 1900)

rubra (Warren, 1904)

sheila Schaus, 1911

straminea Warren, 1905 [CR?]

3 further species unidentified and possibly undescribed

? ***ISOCHROMODES***

1 species unidentified and possibly undescribed

"***ISOCHROMODES***" [species probably misplaced]

carbina (Druce, 1892)

punctata (Warren, 1901)

"***ITAME***" Hübner, [1823] 1816

odrussa Druce, 1892 [excluded from *Itame* and transferred to Cassymini, but of uncertain generic affinity]

LAMBDINA Capps, 1943

axion (Druce, 1882)

LEUCIRIS Warren, 1894

beneciliata Prout, 1910

strictefimbriaria (Oberthür, 1916)

fimbriaria (Stoll, 1781)

imperata (Guenée, [1858])

paecilnidia (Butler, 1881)

institata (Guenée, [1858]) [CR?]

fimbrialis (Stoll, [1790])

1 further species unidentified and possibly undescribed

LEUCULA Guenée, [1858]

cachiaria Schaus, 1912

circundata (Schaus, 1911)

distans Dognin, 1914 [possibly a junior synonym of *planivena* Dognin]

festiva (Cramer, 1775) [junior primary homonym of *Phalaena festiva* Hufnagel]

lucidaria (Walker, 1866) [CR?]

flavilinguaria Snellen, 1874

meganira Druce, 1892

planivena Dognin, 1914

plenivena Dognin, 1914

tiresiaria Guenée, [1858] [CR?]

toxulca Prout, 1931

LEUCULOPSIS Warren, 1901

unifasciata (Druce, 1892)

colorata Warren, 1901

? **LEUCULOPSIS**

1 species unidentified and possibly undescribed

LISSOCHARIS Warren, 1900

nigrivenata Warren, 1900

LOBOPOLA Warren, 1900

oraea (Druce, 1893)

sp. near *cimarrona* (Dognin, 1895)

LOMOGRAPHA Hübner, [1825] 1816

BAPTA Stephens, 1829

CORYCIA Duponchel, 1829 [junior homonym of *Corycia* Hübner, [1823] 1816]

LOMATOGRAPHA Agassiz, 1847 [unjustified emendation]

argentata (Schaus, 1911)

candida (Schaus, 1911)

fidrata (Schaus, 1901)

molesta (Schaus, 1911)

nubimargo (Warren, 1897)

purgata (Walker, [1863]) [CR?]

argentea (Warren, 1897)

2 further species unidentified and possibly undescribed

MACARIA Curtis, 1826

MAEARIA Seyffer, 1850 [misspelling]

abydata Guenée, [1858]

acidalia Walker, 1861

adrasata Snellen, 1874

lataria (Walker, 1861)

ochrata (Warren, 1900)

santaremia Walker, 1861

vagabunda (Inoue, 1986)

achetata Guenée, [1858] [CR?]

approximaria Walker, 1861

- clararia* (Walker, 1861)
bejucoaria (Dyar, 1915)
cardinea (Druce, 1893) **comb. n.** [see Hua & Scoble, in prep.]
 intensata (Warren, 1904)
carpo (Druce, 1893)
 fidelis (Warren, 1897)
combusta (Warren, 1900)
delia (Schaus, 1912) **comb. n.** [see Hua & Scoble, in prep.]
diffusata Guenée, [1858] [CR?] *festivata* Guenée, [1858]
gambarina (Stoll, 1781)
 agnitaria Hübner, 1825
 gambarinata Guenée, [1858] [misspelling]
guapilaria (Schaus, 1911) **comb. n.** [see Hua & Scoble, in prep.]
lydia (Schaus, 1912) **comb. n.** [see Hua & Scoble, in prep.]
nervata Guenée, [1858]
nundinata Guenée, [1858] **comb. n.** [see Hua & Scoble, in prep.]
 orbonata Guenée, [1858]
 orthodisca (Warren, 1905)
 stimulata (Walker, 1866)
ostia (Druce, 1893)
pallidata Warren, 1897 **nom. rev.** [see Hua & Scoble, in prep.]
 trimaculata (Warren, 1906)
 atrimacularia Barnes & McDunnough, 1913
pandaria (Schaus, 1913) **comb. n.** [see Hua & Scoble, in prep.]
pernicata Guenée, [1858]
 cayugaria Schaus, 1923
 continuaria Walker, 1861
 externaria Walker, 1861
 macariata (Walker, 1860)
 nigropunctata (Warren, 1897)
regulata (Fabricius, 1775) **comb. rev.** [see Hua & Scoble, in prep.]
 centrosignata Herrich-Schäffer, 1870
 distans (Butler, 1881)
 enotata Guenée, [1858]
 transvisata Guenée, [1858]
subfulva (Warren, 1906)
trigonata (Warren, 1897)
 quadricaudata (Warren, 1905) **syn. n.** [see Hua & Scoble, in prep.]
1 further species, to be described in Hua & Scoble, in prep., based on the infrasubspecific name
 Semiothisa tenuiscripta Bastelberger, 1908.
- MELANCHROIA** Hübner, [1819] 1816
 MELANCHROEA Agassiz, 1847 [unjustified emendation]
 MILTOPARAEA Wallengren, 1861
chephise (Stoll, 1782)
 corvaria (Fabricius, 1787)
 expositata (Walker, 1862)
 fumosa Grote, 1867
- MELANOLOPHIA** Hulst, 1896
 atrifascia Rindge, 1964

attenuata Rindge, 1964

bostar (Druce, 1892) [CR?]

bugnathos elaphra Rindge, 1964

conspicua Schaus, 1911

fimbriata Rindge, 1964

flexilinea fragosa Rindge, 1964

fugitaria Schaus, 1913

intervallata Warren, 1900

directilinea (Schaus, 1911)

flaviceps (Warren, 1907)

ordinata (Dognin, 1903)

orthoconara Rindge, 1964

parma Rindge, 1964

sadrina Schaus, 1900 [1901]

sadrinaria Rindge, 1964

vegranda Rindge, 1964

2 further species unidentified and possibly undescribed

MELANOPTILON Herrich-Schäffer, 1855

chrysomela (Butler & Druce, 1872)

satellitia (Warren, 1897)

MELANOSCIA Warren, 1904

INCA Warren, 1894 [junior homonym of *Inca* Le Peletier & Serville, 1828]

oreades Druce, 1893

MELINODES Herrich-Schäffer, [1855 June] 1850-1858

MELINOIDES Herrich-Schäffer, 1855 December [misspelling]

cuprina (Warren, 1904) **comb. n.** [from *Nematocampa*]

detersaria Herrich-Schäffer, [1855]

fulvitincta Warren, 1905

MELINODES / PERICLINA Guenée, [1858]

1 species unidentified and possibly undescribed

MESEDRA Warren, 1904

subsequa Warren, 1904

"**METANEMA**" Guenée, [1858] [excluded species]

bonadea Druce, 1892

lurida (Druce, 1898)

striolata Schaus, 1912 [probably a junior synonym of *jodea* (Druce), currently in *Isochromodes* but generic placement uncertain]

3 further species unidentified and possibly undescribed

MICROGONIA Herrich-Schäffer, [1855] 1850-1858

MUCRONODES Guenée, [1858]

perfervata Dognin, 1916

rhodaria (Herrich-Schäffer, [1855])

cariaria (Walker, 1860)

phyllata (Guenée, [1858])

rufaria Warren, 1901

chimboaria (Oberthür, 1911)

particolor Warren, 1904

MICROSEMA Hübner, 1823

MICROSEMIA Gumpenberg, 1887 [misspelling]

asteria (Druce, 1892)

MICROXYDIA Warren, 1895

orsitaria (Guenée, [1858])

defixata (Walker, [1863])

rufifimbriata Warren, 1904

sulphurata (Maassen, 1890)

ruficomma Prout, 1910

MIMOMMA Warren, 1907

ochriplaga Warren, 1907

MIMOSEMA Warren, 1901

consociata (Schaus, 1911)

sobrina (Druce, 1899)

imitans Warren, 1901

inornata (Warren, 1901)

rufa Warren, 1904

MYCHONIA Herrich-Schäffer, 1855

bityla Druce, 1892

excisa Warren, 1906

NEAZATA Warren, 1906

multistrigaria Warren, 1906

NEMATOCAMPA Guenée, [1858]

arenosa Butler, 1881

completa Warren, 1904

confusa punctilinea Schaus, 1912

reticulata Butler, 1881

straminea (Warren, 1900)

benescripta Warren, 1901

varicata Walker, 1860

 2 further species unidentified and possibly undescribed

NEOPANIASIS Rapp, 1945

PANIASIS Druce, 1890 [junior homonym of *Paniasis* Champion, 1886]

aleopetra (Druce, 1890)

tritonaria Schaus, 1913

NEOTHERINA Dognin, 1914

callas (Druce, 1892) **comb. n.** [from *Hydatoscia*]

atomaria (Schaus, 1901) **syn. n.**

imperilla (Dognin, 1911)

inconspicua Dognin, 1914 syn. n.

1 further species unidentified and possibly undescribed

NEPHELOLEUCA Butler, 1883

politia (Cramer, 1776)

politaria (Hübner, [1823])

politata (Fabricius, 1781)

politiata (Guenée, [1858])

semiplaga Warren, 1894

NEPHODIA Hübner, 1823

admirationis (Prout, 1911) [probably a junior synonym of *exclamationis* (Warren)]

auxesia (Druce, 1892)

azenia (Druce, 1892)

ochrea (Warren, 1900)

betala (Druce, 1892)

xanthostigma Prout, 1910

coalitaria (Schaus, 1911)

crata (Druce, 1893)

distincta (Warren, 1901)

estriada (Dognin, 1900) [CR?]

fronsaria (Schaus, 1912)

irrorata (Schaus, 1912)

luteopunctata (Thierry-Mieg, 1907)

mitellaria (Schaus, 1912)

orcipennata (Walker, [1863])

satyrata (Warren, 1900)

ordaea (Druce, 1893) [CR?]

organa (Druce, 1893)

pectinata (Schaus, 1912) [near or synonym of *exclamationis* (Warren)]

punctularia (Schaus, 1912)

viatrix (Thierry-Mieg, 1892)

chiapensis (Hoffmann, 1934)

vicinaria (Schaus, 1912)

xanthosoma (Dognin, 1914)

7 further species unidentified and possibly undescribed

NEPITIA Walker, 1866

detractaria Walker, 1866

? **NESALCIS** Warren, 1897

1 species unidentified and possibly undescribed

NUMIA Guenée, [1858]

terebintharia Guenée, [1858]

buxaria Guenée, [1858]

diffissa (Walker, 1861)

factaria (Walker, 1861)

heterochloriaria (Herrich-Schäffer, 1870)

subcelata (Walker, 1861)

subvectaria (Walker, 1861)

"*ODYSIA*" Guenée, [1858] [species probably misplaced]
venusta (Warren, 1900)

OENOPTILA Warren, 1895

OENOHALIA Warren, 1897 syn. n.

costata Warren, 1904

laudata Schaus, 1911 syn. n.

perrubra (Kaye, 1901)

egeria Schaus, 1912 syn. n.

ignea Warren, 1904 [generic placement uncertain]

recessa Dognin, 1901

separata Warren, 1908 [near *alexonaria* (Walker) comb. n., type species of *Oenothalia*]

violacea (Herrick-Schäffer, 1858) comb. n. [from *Melinoessa*]

"*OENOPTILA*" [the following species were included in *Oenoptila* or its junior synonym *Oenopthalia* but are here excluded]

interrupta subconfusa Warren, 1905

montivaga Schaus, 1911

2 further unidentified and possibly undescribed species, placed provisionally in this genus.

OPHTHALMOBLYSIS Scoble, 1995

1 species unidentified and possibly undescribed

OPISTHOXIA Hübner, [1825] 1816

ARGYROPLUTODES Warren, 1894

CALLURAPTERYX Warren, 1894

OPHTHALMOPHORA Guenée, [1858]

amabilis (Cramer, 1777) [CR?]

amabilis Hübner, [1825]

amabiiliata Guenée, [1858]

asopis (Druce, 1892)

bella (Butler, 1881)

cluana (Druce, 1900)

formosante (Cramer, 1779)

formosantata (Guenée, [1858])

interrupta Schaus, 1911

metargyria (Walker, 1867)

quadrifilata (Felder & Rogenhofer, 1875)

miletia (Druce, 1892)

molpadia (Druce, 1892)

phrynearia (Schaus, 1912)

saturniaria comptata (Bastelberger, 1911)

griseolimitata (Dognin, 1914)

uncinata (Schaus, 1912)

OXYDIA Guenée, [1858]

affinis (Warren, 1897)

apidania (Cramer, 1779)

alpiscaria Walker, 1860

apidiniata Guenée, [1858]

batesii Felder & Rogenhofer, 1875

- gastropachata* Guenée, [1858]
armiaria Schaus, [date untraced]
augusta Druce, 1892
bilinea (Schaus, 1911)
clavata Felder & Rogenhofer, 1875
fulcata (Schaus, 1898)
geminata Maassen, 1890
 yema Dognin, 1897
hoguei Brown, Julian, Donahue & Miller, 1991
insolita (Warren, 1900)
 subalbescens Dognin, 1901
masthalala Druce, 1892
mexicana Guenée, [1858]
 artaxa Druce, 1892
 sericaria (Butler, 1886)
 sericearia (Walker, 1866)
 sinuosa (Schaus, 1911)
nimbata Guenée, [1858]
 noctuitaria Walker, 1860
 vitiligata Felder & Rogenhofer, 1875
obtusaria Schaus, 1912
peosinata distans (Warren, 1904) [CR?] *platyptera* Guenée, [1858]
 rotara (Schaus, 1901)
 sociata (Warren, 1895)
 subdecorata (Warren, 1904)
translinquens (Walker, 1860)
 nattereri Felder & Rogenhofer, 1875
trychiatia Guenée, [1858]
 mundipennata (Walker, 1860)
 oricusaria (Walker, 1860)
 translineata (Walker, 1860)
 trapezata Guenée, [1858]
 xanthochroma (Bastelberger, 1908)
vesulia (Cramer, 1779)
 vesuliata Guenée, [1858]
3 further species unidentified and possibly undescribed

PALYAS Guenée, [1858]

divitaria Oberthür, 1916

micacearia (Guenée, [1858])

PANTHERODES Guenée, [1858]

PANTHERA Hübner, 1823 [junior homonym of *Panthera* Oken, 1816]

unciaria Guenée, [1858]

PARADOXODES Warren, 1904

subalbata (Dognin, 1900)

subdecora Warren, 1904

PARAGONIA Hübner, [1823] 1816

CLYSIA Guenée, [1858] [junior homonym of *Clydia* Leach, 1817]

arbocala Druce, 1891

cruraria (Herrich-Schäffer, [1854] 1850-1858)

laugininosa Schaus, 1913

planimargo Warren, 1900

procidaria (Herrich-Schäffer, 1856)

nummularia Möschler, 1881

pardipennaria (Walker, 1860)

tasima (Cramer, 1779)

absconditaria (Walker, 1860)

discolor (Walker, 1861)

tasimaria Hübner, [1823]

tasimata (Guenée, [1858])

1 further species unidentified and possibly undescribed

PARALLAGE Warren, 1900

diaphanata (Maassen, 1890)

inconcinna Dognin, 1914

PARAPHOIDES Rindge, 1964

bura (Druce, 1892)

foeda Rindge, 1964

PAROURAPTERYX Thierry-Mieg, 1904

sulphuraria (Maassen, 1890) [CR?]

sericea (Warren, 1900)

PATALENE Herrich-Schäffer, [1854] 1850-1858

COMIBAENA Herrich-Schäffer, 1855 [junior homonym of *Comibaena* Hübner [1823] 1816]

DREPANODES Guenée, [1858]

HALESA Walker, 1860

abrasata (Guenée, [1858]) [possibly a junior synonym of *distycharia* Guenée]

aenetusaria (Walker, 1860)

andinaria (Oberthür, 1881)

glauca (Butler, 1881)

melina (Druce, 1892)

asina (Druce, 1892)

asychisaria (Walker, 1860)

gonodontaria (Snellen, 1874)

undulinaria (Oberthür, 1912)

chaonia (Druce, 1887)

epionata (Guenée, [1858])

amyitisaria (Walker, 1860)

bicesaria (Walker, 1860)

ochrea (Butler, 1878)

oemearia (Walker, 1860)

pappiaria (Walker, 1860)

pionaria (Walker, 1860)

spadicearia (Möschler, 1888)

tellesaria (Walker, 1860)

falcularia Herrich-Schäffer, [1854] 1850-1858

drepanaria (Möschler, 1881)

hamulata (Guenée, [1858])

harpagulata (Guenée, [1858])

insudata (Guenée, [1858])

meticulata (Guenée, [1858])

siculata (Guenée, [1858])

icarinaria (Oberthür, 1912) [CR?]

luciata (Stoll, 1790)

apiculata (Dalman, [date untraced])

byblusaria (Walker, 1860)

drepanula (Hübner, 1823)

drepanularia (Guenée, [1858])

latistrigaria (Herrich-Schäffer, 1855)

plebejata (Snellen, 1874)

suggillaria (Snellen, 1874)

trogonaria (Herrich-Schäffer, [1856])

PERICLINA Guenée, [1858]

apricaria (Herrich-Schäffer, 1855)

merana (Schaus, 1911)

syctaria (Walker, 1860)

ciceronata Oberthür, 1912

daldama Schaus, 1901

dedalona (Dognin, 1913)

olorosa (Dognin, 1893)

spiritata Oberthür, 1912

"**PERICLINA**" [excluded species]

cervinoides Schaus, 1911 [revision by D.C. Ferguson, in prep.]

PERIGRAMMA Guenée, [1858]

albivena Dognin, 1906

intermedia Thierry-Mieg, 1916

repetita Warren, 1905

PERISSOPTERYX Warren, 1897

commendata (Schaus, 1912)

delusa Warren, 1897

fletcheri Krüger & Scoble, 1992

gamezi Krüger & Scoble, 1992

griseobarbipes Krüger & Scoble, 1992

neougaldei Krüger & Scoble, 1992

nigricornata (Warren, 1901)

muricolor (Schaus, 1911)

ochreobarbipes Krüger & Scoble, 1992

raveni Krüger & Scoble, 1992

submarginata (Schaus, 1911)

ugaldei Krüger & Scoble, 1992

- PERO* Herrich-Schäffer, 1855
AZELINA Guenée, [1858]
AZELINOPSIS Warren, 1896
EGABRA Walker, 1858
EUSENEA Walker, 1860
MARMAREA Hulst, 1896
METICULODES Guenée, [1858]
PERGAMA Herrich-Schäffer, 1855
STENASPILATES Packard, 1876
STENODONTA Warren, 1905
SYNEMIA Guenée, [1858]
afuera Poole, 1987
amanda (Druce, 1898)
 dissimilis (Warren, 1905)
astapa (Druce, 1892)
 egregiata (Pearsall, 1906)
asterodia (Druce, 1892)
aurunca (Druce, 1892)
 metella (Druce, 1892)
boa Poole, 1987
bulba Poole, 1987
chapela Poole, 1987
circumflexuta Prout, 1928
clysiaria (Felder & Rogenhofer, 1875)
 gammaria Möschler, 1881
 nicca (Druce, 1892)
corata (Schaus, 1901)
coronata (Warren, 1904)
costa Poole, 1987
delauta (Warren, 1907)
derecha Poole, 1987
dorsipunctata (Warren, 1900)
dularia Poole, 1987
exquisita (Thierry-Mieg, 1894)
 exquisitata Kay & Lamont, 1927 [misspelling]
fusaria (Walker, 1860)
 adrastaria (Oberthür, 1883)
 egens Dognin, 1912
 nasuta (Warren, 1895)
heralda Poole, 1987
idola Poole, 1987
incisa (Dognin, 1889)
infantilis (Warren, 1897)
iraza Poole, 1987
kaybina Poole, 1987
lessema (Schaus, 1901)
lignata (Warren, 1897)
lindigi (Felder & Rogenhofer, 1875)
 curvistigma Dognin, 1912
 indistincta (Warren, 1908)
melissa (Druce, 1892)

- subochreata* (Warren, 1900)
mnasilaria (Oberthür, 1912)
nigra (Warren, 1904)
odouaria (Oberthür, 1883)
orosata Poole, 1987
parambensis Dognin, 1907
pinsa Poole, 1987
plagodiata (Warren, 1897)
pobrata Poole, 1987
polygonaria (Herrich-Schäffer, 1855)
protea Poole, 1987
radiosaria (Hulst, 1886)
 apapinaria (Dyar, 1908)
 fulvata (Warren, 1905)
 metzaria (Dyar, 1909)
 muricolor Warren, 1900
 rectissima (Dyar, 1910)
rapta Prout, 1928 [CR?] *?*
rosota Poole, 1987
rotundata (Warren, 1900)
rumina (Druce, 1892)
saturata (Walker, 1867)
 emmaria (Oberthür, 1883)
simila Poole, 1987
solitaria (Schaus, 1911)
spongiate (Guenée, [1858])
 triplilunata (Prout, 1911)
stuposaria (Guenée, [1858])
 marcaria (Oberthür, 1883)
 trailii (Butler, 1881)
tabitha (Maassen, 1890)
 rogenhoferi (Druce, 1892)
 saturata (Felder & Rogenhofer, 1875)
vecina (Schaus, 1901)
xylinaria (Guenée, [1858])
7 further species unidentified and possibly undescribed
- "*PETELIA*" Herrich-Schäffer, 1855 [excluded species]
cariblanca Schaus, 1911
fumida (Schaus, 1913)
nigriplaga Schaus, 1901
nigrivestita Schaus, 1911
pallidula Schaus, 1911 [near or synonym of *Oenoptila interrupta* Warren]
purpurea Warren, 1904
umbrosa Schaus, 1911
vinasaria Schaus, 1911
3 further species unidentified and possibly undescribed
- PHEROTESIA*** Schaus, 1901
alterata Warren, 1905
caeca Rindge, 1964

funebris (Schaus, 1912)
malinaria malinaria Schaus, 1900 [1901]
potens Warren, 1905
 parallelaria Dognin, 1916
ralla Rindge, 1990
supplanaria (Dyar, 1913)
3 further species unidentified and possibly undescribed

PHRYGIONIS Hübner, [1825] 1816
 BYSSODES Guenée, [1858]
 CHRYSOTAENIA Herrich-Schäffer, 1855
 RATIARIA Walker, 1861
paradoxata steelorum Brown, Donahue & Miller, 1991
platinata naevia (Druce, 1892)
polita (Cramer, 1780)
 amblopa Prout, 1933
 appropriata Walker, 1861
 metaxantha Walker, 1861
 modesta Warren, 1904
 modesta marta Prout, 1933
 sestertiana Prout, 1933
 stenotaenia Prout, 1933
 stenotaenia isthmia Prout, 1933
 stenotaenia miura Prout, 1933
privignaria Guenée, [1858]
 incolorata restituta Prout, 1933

PHYLE Herrich-Schäffer, [1855] 1850 1858
arcuosa Herrich-Schäffer, [1855]
 facetaria Guenée, [1858] nomen nudum
cartago Rindge, 1990
infusca Rindge, 1990 [CR?]
schausaria (H. Edwards, 1884)
subfulva Herbuleot, 1982

PHYLLODONTA Warren, 1894
cataphracta Prout, 1931
druciata Schaus, 1901
flabellaria (Thierry-Mieg, 1894)
indeterminata Schaus, 1901
 canniata Schaus, 1901
latrata (Guenée, [1858])
matalia (Druce, 1891)
succedens (Walker, 1860)
 nolkeniata (Snellen, 1874)
timareta (Druce, 1898)

PHYSOCLEORA Warren, 1897
minuta (Druce, 1898) comb. n. [from *Hypomecis*] [junior homonym of *Physocleora minuta* (Warren, 1897)]
pauper Warren, 1897

pulverata Warren, 1907

taeniata Warren, 1907 [CR?]

2 further species unidentified and possibly undescribed

PITYEJA Walker, 1861

APLORAMA Warren, 1904

histriionaria (Herrich-Schäffer, 1853)

bellaria (Walker, 1861)

fulvida (Warren, 1909)

magnifica (Bastelberger, 1909)

pura (Warren, 1894)

tigridata (Warren, 1909)

POLLA Herrich-Schäffer, 1855

hemeraria Dyar, 1910

PROCHOEROODES Grote, 1883

AESCHROPTERYX Butler, 1883

CHAEROODES Guenée, [1858] [misspelling of *Choerodes*]

CHOEROODES Guenée, [1858] [junior homonym of *Choerodes* Leidy, 1852]

flexilinea (Warren, 1904) **comb. n.**

marciana (Druce, 1891) **comb. n.**

martina (Druce, 1891) **comb. n.**

onustaria (Hübner, 1832) **comb. n.**

incaudata (Guenée, [1858])

invisata (Guenée, [1858])

palindriaria (Walker, 1860)

pilosa (Warren, 1897)

bolivari (Oberthür, 1911)

germaini (Oberthür, 1911)

striata (Stoll, [1790]) **comb. n.**

asyllusaria (Walker, 1860)

mattogrossaria (Oberthür, 1911)

praecurvata (Warren, 1904)

tetragonata (Guenée, [1858]) **comb. n.**

bifilaria (Felder & Rogenhofer, 1875)

invariaria (Walker, 1860)

sectata (Oberthür, 1911)

1 further species unidentified and possibly undescribed

PSILOSETIA Warren, 1900

pura Warren, 1900

PYRINIA Hübner, 1818

arxata Druce, 1892 [CR?]

augustata (Oberthür, 1912) [CR?]

divalis (Druce, 1898)

hilaris (Warren, 1906) **syn. n.**

faragita (Schaus, 1901) [may belong in *Cyclomia*]

flavida Dognin, 1918

helvaria (Herrich-Schäffer, [1854] 1850-1858) [CR?]

incensata Walker, [1863]

itunaria Walker, 1860

parata (Oberthür, 1912)

subapicata Dognin, 1934

megara Druce, 1892

optimata (Guenée, [1858])

fridolinata (Oberthür, 1912)

rufinaria Schaus, 1912

saturata Walker, [1863]

punctilinea Schaus, 1913

sanitaria Schaus, 1901

selecta Schaus, 1912

5 further species unidentified and possibly undescribed

RHOMBOPTILA Warren, 1894

brantsiata (Snellen, 1874)

SABULODES Guenée, [1858]

aegrotata (Guenée, [1858])

arsesaria (Walker, 1860)

caberata form *cottlei* Barnes & Benjamin, 1926

arses Druce, 1891

exonorata Guenée, [1858] [CR?]

exhornata Oberthür, 1911

loba Rindge, 1978 [CR?]

matrica Druce, 1891

ornatissima Thierry-Mieg, 1892

plauta Rindge, 1978

setosa Rindge, 1978

subalbata (Dognin, 1914)

1 further unidentified and possibly undescribed species, placed provisionally in this genus.

"**SABULODES**" [excluded from *Sabulodes* by Rindge, 1978: 288]

acidaliata Guenée, [1858] [CR?]

arge Druce, 1891 [revision by D.C. Ferguson, in prep.]

arnissa Druce, 1891

bilineata Warren, 1897

separanda Dognin, 1913

colombiata Guenée, [1858]

exsecrata Schaus, 1911

lineata Schaus, 1911

nubifera Schaus, 1911

rotundata Dognin, 1918

SEMIOTHISA Hübner, 1818

PARASEMIA Hübner, 1823 [junior homonym of *Parasemia* Hübner, [1820] 1816]

arenisca (Dognin, 1896)

areniscoides (Dognin, 1896)

inxecisa Warren, 1897

sarda (Warren, 1906)

disceptata (Walker, 1861)

discorptata Möschler, 1886

divergentata (Snellen, 1874)

gambaria Hübner, 1818

percisaria (Walker, 1861)

masonata Schaus, 1897

plurimaculata Warren, 1906

poasaria Schaus, 1911

salsa Warren, 1905

valmonaria Schaus, 1901

aspila Dognin, 1914

discata Schaus, 1901

"SEMIOTHISA" [excluded species]

praegrandis Bastelberger, 1907 [Macariini but of uncertain generic affinity; see Scoble & Krüger, in prep.]

SERICOPTERA Herrich-Schäffer, 1855

RIPULA Guenée, [1858]

area (Cramer, [1775])

arearia (Hübner, [1825])

areata (Fabricius?, 1781?)

reducta Warren, 1909

chiffa (Thierry-Mieg, 1905) [CR?]

discolor Warren, 1909

mahometaria Herrich-Schäffer, 1853

mexicaria (Guenée, [1858])

SICYA Guenée, [1858]

aurunca Druce, 1892

directaria Guenée, [1858]

bala Druce, 1892 [this synonymy, by Beutelspacher (1988: 475) is dubious]

macularia mexicola Dyar, 1922

inquinata Warren, 1897 [treated as a junior synonym of *directaria* by Beutelspacher (1988: 475) but probably a good species]

3 further species unidentified and possibly undescribed

SIMENA Walker, 1856

luctifera Walker, 1856

aequinoctialis (Boisduval, 1870)

joaria (Guenée, [1858])

SIMOPTERYX Warren, 1894

torquataria (Walker, 1860)

1 further species unidentified and possibly undescribed

SPHAECLODES Guenée, [1858]

BROTIS Hübner, 1823 [junior homonym of *Brotis* Hübner, [1821] 1816]

SPHAECLODES Hulst, 1896 [misspelling]

SPHOECELODES Neave, 1940 [misspelling]

quadrilineata (Warren, 1900)

tenebrosa (Dognin, 1913)

vulneraria (Hübner, 1823)

floridensis Holland, 1884

STENALCIDIA Warren, 1897

farinosa Warren, 1897 [CR?]

inclinataria (Walker, 1860)

nucaya Dognin, 1900

pleuaria (Walker, 1860)

pulverosa Warren, 1897

quisquilaria (Guenée, [1858])

homonica Schaus, [date untraced]

sanguistellata Schaus, 1933

vacillaria (Guenée, [1858])

perspectata (Walker, [1863])

STIBARACTIS Warren, 1894

dioptis Felder & Rogenhofer, 1875

SYNECTA Warren, 1897

duplicata Warren, 1900

SYNNOMOS Guenée, [1858]

firmamentaria Guenée, [1858]

gabraria (Walker, 1860)

gracililinea (Warren, 1905)

urota (Druce, 1898)

vesta (Druce, 1898)

TARMA Rindge, 1983

theodora (Thierry-Mieg, 1892)

TETRACIS Guenée, [1858]

belides Druce, 1892

picturata (Schaus, 1911)

TETRAGONODES Guenée, [1858]

anopsaria Guenée, [1858]

neon (Druce, 1892)

rufata Dognin, 1900

"**TETRAGONODES**" [excluded species]

murcia (Schaus, 1913) [near or synonym of "*Metanema striolata* Schaus"]

THYRINTEINA Möschler, 1890

arnobia (Stoll, [1782])

arnobiaria (Guenée, [1858])

immissus (Felder & Rogenhofer, 1875)

oppositaria (Walker, 1860)

THYSANOPYGA Herrich-Schäffer, 1855

PACHYDIA Guenée, [1858]

abdominaria (Guenée, [1858])

agasusaria (Walker, 1860)

bilbisaria (Walker, 1860)

amarantha Debauche, 1937

carfinia (Druce, 1893)

gauldi Krüger & Scoble, 1992

olivescens Krüger & Scoble, 1992

"**THYSANOPYGA**" [excluded from *Thysanopyga* by Krüger & Scoble, 1992: 116; some of the following species are under revision by D.C. Ferguson]

casperia Druce, 1893

fuscaria Schaus, 1911

nictaria (Guenée, [1858])

nigristica (Warren, 1857)

oroauda (Druce, 1893) [CR?]

picturata (Schaus, 1911) [here excluded from *Thysanopyga*]

proditata (Walker, 1861)

fulva Warren, 1900

gausaparia Grote, 1881

TMETOMORPHA Warren, 1904

bitias (Druce, 1892)

1 further species unidentified and possibly undescribed

TORNOS Morrison, 1875

brutus Rindge, 1954

penumbrosa Dyar, 1915

punctata (Druce, 1899)

spinosus Rindge, 1954

TRICHOSTICHIA Warren, 1895

bifinita (Walker, 1862)

pexatata (Möschler, 1881)

TROTOGONIA Warren, 1905

castraria Jones, 1921

TROTOWERA Warren, 1894

arrhapa (Druce, 1891)

olivifera Prout, 1933

UREPIONE Warren, 1895

quadrilineata (Walker, [1863])

GENERA INDET.

9 species unidentified and possibly undescribed

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REFERENCES

- FORBES, W.T.M. 1948. Lepidoptera of New York and neighboring states, pt. 2. Memoirs, Cornell University Agricultural Experiment Station № 274: 1-263.
- GASTON, K.J., SCOBLE, M.J. & CROOK, A. 1995. Patterns in species description: a case study using the Geometridae (Lepidoptera). Biological Journal of the Linnean Society 55: 225-237.
- HOLLOWAY, J.D. [1994], dated 1993. The Moths of Borneo: Family Geometridae, subfamily Ennominae; part 11. Malayan Nature Journal, 47: 1309, 593 figs, 19 col. pls.
- JANZEN, D.H. 1993. What does tropical society want from the taxonomist? Pp. 295-307, in: LaSalle, J. & Gauld, I.D. Hymenoptera and Biodiversity, CAB International, Wallingford, xi+348 pp.
- KLOTS, A.B. 1956. Lepidoptera. Pp. 97-111. In Tuxen S.L., ed. Taxonomist's glossary of genitalia in insects. Copenhagen.
- KRÜGER, M. & M.J. SCOBLE. 1992. Neotropical red-brown Ennominae in the genera *Thysanopyga* Herrich-Schäffer and *Perissopteryx* Warren (Lepidoptera: Geometridae). Bulletin of the British Museum (Natural History). (Ent.) 61: 77-148.
- MCGUFFIN, W.C. 1972. Guide to the Geometridae of Canada (Lepidoptera). II. Subfamily Ennominae. I. Memoirs of the Entomological Society of Canada 86: [i-ii], 1-159.
- POOLE, R.W. 1987. A taxonomic revision of the New World moth genus *Pero* (Lepidoptera: Geometridae). U.S. Department of Agriculture, Technical Bulletin № 1698: [i]-ii, 1-257, figs. 1-1116.
- RINDGE, F.H. 1961. A revision of the Nacophorini (Lepidoptera, Geometridae). Bulletin of the American Museum of Natural History 123: 87-154, text figs. 1-46, pls. 18-23.
- RINDGE, F.H. 1964. A revision of the genera *Melanolophia*, *Pherotesia* and *Melanotesia* (Lepidoptera, Geometridae). Bulletin of the American Museum of Natural History 126: 241-434, text figs. 1-163, pls. 3-9.
- RINDGE, F.H. 1965. A revision of the Nearctic species of the genus *Glena* (Lepidoptera, Geometridae). Bulletin of the American Museum of Natural History 129: 265-306, figs. 1-28.
- RINOGE, F.H. 1966. A revision of the moth genus *Anacamptodes* (Lepidoptera, Geometridae). Bulletin of the American Museum of Natural History 132: 175-244, text figs. 1-53, pls. 22-25.
- RINDGE, F.H. 1967. A revision of the neotropical species of the moth genus *Glena* (Lepidoptera, Geometridae). Bulletin of the American Museum of Natural History 135: 107-172, figs. 1-50.
- RINOGE, F.H. 1978. A revision of the genus *Sabulodes* (Lepidoptera, Geometridae). Bulletin of the American Museum of Natural History 160: 193-292, figs. 1-154, table 1.
- RINDGE, F.H. 1979. A revision of the North American moths of the genus *Lomographa* (Lepidoptera, Geometridae). American Museum Novitates № 2673: 1-18, figs. 1-20, maps 1-3.
- RINDGE, F.H. 1983. A generic revision of the New World Nacophorini (Lepidoptera, Geometridae). Bulletin of the American Museum of Natural History 175: 147-262, figs. 1-124, tables 1-9.
- RINDGE, F.H. 1985. A revision of the moth genus *Acronyctodes*, with a review of the New World Bistonini (Lepidoptera, Geometridae). American Museum Novitates № 2807: 1-24, figs. 1-32, tables 1-4.
- RINDGE, F.H. 1990a. A revision of the moth genus *Phyle* (Lepidoptera, Geometridae). American Museum Novitates № 2969: 1-29, 52 figs.
- RINDGE, F.H. 1990b. A revision of the Melanolophini (Lepidoptera, Geometridae). Bulletin of the American Museum of Natural History 199: 1-148.
- SCOBLE, M.J. 1994. A taxonomic revision of the genera *Phrygionis* Hübner and *Pityeja* Walker (Geometridae: Ennominae, Palyadini). Zoological Journal of the Linnean Society 111: 99-160.
- SCOBLE, M.J. 1995. A review of the moth tribe Palyadini with the description of a new genus (Geometridae: Ennominae). Systematic Entomology 20: 35-58.

- SCOBLE, M.J., K.J. GASTON & A. CROOK. 1995. Using taxonomic data to estimate species richness in Geometridae. *Journal of the Lepidopterists' Society* 49: 136-147.
- SOULE, M.E. 1990. The real work of systematics. *Annals of the Missouri Botanical Gardens* 77: 4-12.
- STAMP, N.E. & T.M. CASEY. [eds] 1993. Caterpillars: ecological and evolutionary constraints on foraging. xii+587 pp. Chapman & Hall, New York & London.
- VANE-WRIGHT, R.I. 1993. Systematics and the conservation of biodiversity: global, national and local perspectives. Pp. 197-211, in: Gaston, K.J. & Samways, M.J. *Perspectives on Insect Conservation*. Intercept, Andover.
- WEST, J.G. AND E.S. NIELSEN. 1992. Management and accessibility of biological collections. *Australian Biologist* 5: 68-75.
- WILSON, E.O. 1992. *The diversity of life*. Allen Lane, London.